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Armin Kubelbeck

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EXAMINER

EMPIE, NATHAN H

ART UNIT

PAPER NUMBER

1712

NOTIFICATION DATE

DELIVERY MODE

03/22/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mwzb.com

Office Action Summary	Application No. 10/526,497	Applicant(s) KUBELBECK ET AL.	
	Examiner NATHAN H. EMPIE	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/9/10, 1/3/11.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4,6-8,10-12,14 and 17-30 is/are pending in the application.
- 4a) Of the above claim(s) 17 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,4,6-8, 10-12, 14, 19-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/3/11</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/9/10 has been entered, claims 2, 4, 6-8, 10-12, 14, 19-30 are pending examination, claims 17-18 have been previously withdrawn.

Information Disclosure Statement

The information disclosure statement filed 1/3/11 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Copies of the JP documents listed on the 1/3/11 IDS were not submitted therefore these documents were not considered. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 22 recites the limitation "a process according to claim 16...". There is insufficient antecedent basis for this limitation in the claim since claim 16 has been

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cancelled. For purposes of examination claim 22 will be interpreted as being dependant from claim 8.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki in view of Ichinose et al (US patent 5,688,366; hereafter Ichinose), Skorupski et al (US 2002/0162218; hereafter Skorupski) and Klein et al (machine translation of DE10101926; hereafter Klein)

Claim 14: Yamazaki teaches a method for etching of silicon surfaces and layers for isolation of the pn transition in solar cells comprising applying an etching medium to the surface of said silicon or a layer for isolation of the pn transition in a solar cell (texture, selective pattern, 106 to the uppermost portion of silicon substrate 105, Fig 2A, (col 11 lines 44-64); and it is preferable that a portion in the vicinity of the surface of the n-type conductive region 107 is etched and removed by sodium hydroxide (not shown), (col 12 lines 14 – 28).

Yamazaki does not teach a thickened etching medium. Ichinose teaches a chemical etching process with an alkali solution mixed with an additive to form a paste (col 3 lines 35-52). The motivation to thicken the etching medium taught by Yamazaki is provided by Ichinose that teaches that etching with a paste “has excellent selectivity,

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and does little to no damage to the non-etching region” (col 1 lines 8-16), additionally, Ichinose teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have thickened, as taught by Ichinose, the etching medium taught by Yamazaki to enable spatial etch selectivity that would eliminate processing steps.

Yamazaki further teaches forming a textured substrate surface, which is selectively exposed to the etchant to produce said structure (see, for example, col 11 lines 44-64). Yamazaki further teaches wherein the desired surface texture formed on the silicon substrate possess surface features on the order of 0.1 to 5 microns. Yamazaki has taught wherein the etching / texturing is intentional to control light scattering. Although Yamazaki has not explicitly taught wherein the etching is conducted to a depth of 1-3 microns, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such a range of etching depth since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) and further since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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Yamazaki further teaches wherein the base constituent (see, for example NaOH) is in an amount of about 2% of the etching paste medium (col 11 lines 43 – 64). Yamazaki does not explicitly teach wherein the base constituent is in an amount between 5 to 48 % by weight of total amount of said etching medium. Prior art Skorupski teaches NaOH etching mediums possessing between 8 and 16 %wt NaOH by weight of etching medium can suitably and predictably etch silicon substrates ([0020-022]). Because both Skorupski and Yamazaki in view of Ichinose teach method of etching silicon with NaOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a NaOH % of 8 to 16 wt% by weight of etching medium, as taught by Skorupski, as the amount of NaOH in the method of Yamazaki in view of Ichinose as Skorupski teaches the suitability and predictability of etching silicon surfaces within this taught concentration range, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP 2144.05II A).

Yamazaki in view of Ichinose and Skorupski have taught (above) wherein alkaline-hydroxide etchant is diluted in a water solvent, but none of these references explicitly teach wherein the etching medium further comprises at least one other solvent. Klein teaches a chemical etching process comprising a thickened etching medium designed to etch silicon containing surfaces (abstract, pg 2). Klein further

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teaches that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as solvents for such thickened etching media (pg 3). As both Klein and the method of Yamazaki in view of Ichinose and Skorupski have taught thickened etching compositions for predictably etching silicon containing surfaces comprising an aqueous solvent it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for one or the well known solvents taught by Klein, such as 1,2-Propandiol, to achieve the predicable result of etching a silicon containing surface.

Claims 2, 4, 6-8, 10-12, 19-24, and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skorupski in view of Klein.

Claims 2, 8, 10, and 29: Skorupski teaches the method of manufacturing circuit boards comprising etching silicon substrates and substrates with compositions containing silicon by applying an etchant on the surface of the substrates ([0007-0020]). Skorupski further teaches the selective etching of such substrate (see, for example, [0021]). Wherein the etching of silicon surfaces and layers is performed by an alkaline liquid (aqueous alkaline solution) typically in a concentration range of between about 5% to 25% by weight of the etchant medium ([0021-0022]). Skorupski teaches that duration of the etching step is determined by the chemical composition of the substrate, and is generally from about 10 sec to 4 min (see, for example, [0026]). Skorupski does not explicitly teach an exposure time of from 30 sec to 5 min, but it would have been obvious to one of ordinary skill in the art at the time of invention to have selected an

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exposure time of from 30 sec to 5 min since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Skorupski further teaches the etchant is activated by the input of energy (see, for example, exposure to thermal energy / heat, as etching by heating the etchant to temperatures between 40 to 65°C, [0026]).

Skorupski further teaches wherein the specific / selective areas to be etched are typically etched to remove at least 0.45 microns from the substrate (see, for example, [0024-0025]). Although Skorupski does not explicitly teach etching at depth within the range of 1-3 microns, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an etch depth with the range since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)

Skorupski does not teach that the alkaline solution is thickened. Klein teaches a chemical etching process designed to etch silicon oxide surfaces wherein the etchant is mixed with an additive to form a paste (abstract, pg 2). Klein additionally teaches that the motivation to thicken the etching medium is that it allows a printable, homogeneous etching paste which is significantly less expensive than conventional wet and dry etching methods in the liquid and gas phases (pg 2), additionally use of a thickened paste allows for a high degree of automation and surface design (further support for selectively etching) (pg 2, 5). Therefore it would have been obvious to one of ordinary

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skill in the art at the time of the invention to have thickened, as taught by Klein, the etching medium taught by Skorupski to enable a printable etching process which is significantly less expensive, and possesses a high degree of automation and surface design.

Skorupski in view of Klein teaches the process of claim 8 (above) wherein Skorupski has taught the etching medium comprises at least one solvent (water, as the etchant is an aqueous alkaline solution) [0022]. And Klein teaches the addition of a thickener to make the etching solution a paste (pg 4). Additionally Klein teaches that a variety of additives can have a positive effect on the printability of the printing paste (pg 4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated additives as taught by Klein, in to the method of Skorupski in view of Klein as the taught additive can improve the printability of the etching paste. Further the examiner asserts that in claim 2 said additive is presented as optional, so this further limitation of a specific additive is not relevant to the rejection as presented wherein the actually required limitations of claim 2 have been met.

Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4). The combination of these components would leave between 55 and 87% of solvent by weight of the total amount of the etching medium. Klein teaches a chemical etching process comprising a thickened etching medium designed to etch silicon containing

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surfaces (abstract, pg 2). Klein further teaches that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as solvents for such thickened etching media. As both Klein and the method of Skorupski in view of Klein have taught thickened etching compositions for predictably etching silicon containing surfaces comprising an aqueous solvent it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for one or the well known solvents taught by Klein, such as 1,2-Propandiol, to achieve the predicable result of etching a silicon containing surface.

Skorupski further teaches wherein the etching component is a hydroxide, for example, NaOH and KOH ([0022]).

Claim 4: Skorupski in view of Klein teach the process of claim 8 (above), wherein Skorupski further teaches wherein the etching component is KOH ([0022]).

Claim 6 and 29: Skorupski in view of Klein teach the process of claim 2 (above), wherein Klein further teaches preferably the weight % of thickener is about 3 to 20% by weight of the total etching medium (pg 4) and that the thickener is, for example, hydroxyethylcellulose (pg 4).

Claim 7: Skorupski in view of Klein teach the process of claim 2 (above), wherein Klein further teaches wherein the additive is, for example, a thixotropic agent (pg 4).

Claim 11: Klein further teaches the thickened etching paste is suitable for printing processes such as screen printing, stamping, and ink-jet printing (pg 5)

Claim 12: Skorupski further teaches rinsing off the etchant with deionized water ([0026]).

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Claims 19 and 29: Skorupski in view of Klein teach the process of claim 5 (above), wherein Skorupski in view of Klein taught that between 55 and 87% of solvent (water) by weight of the total amount of the etching medium (in the rejection to claim 5 above). Although these prior arts did not explicitly teach said solvent is from 15 to 85% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a concentration of solvent within the claimed range since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 20: Skorupski in view of Klein teach the process of claim 8 (above), within claim 8 from which claim 20 depends, carboxylic acid ester is presented as one of a group of solvents used together or separately with water, therefore if a carboxylic acid ester was not chosen as the additional solvent, the further limitation on carboxylic acid ester is not relevant to the rejection as presented. Further Klein who teaches that using a mixed solvent system is well known in the art has further explicitly taught [2,2-butoxy(ethoxy)]ethyl acetate or propylene carbonate (pg 3).

Claim 21: Skorupski in view of Klein teach the process of claim 2 (above), wherein in claim 2 said additive is presented as optional, so this further limitation of a specific additive is not relevant to the rejection as presented wherein the required limitations have already been met in the rejection of claim 2 (described above).

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Claims 22, 24, and 29: Skorupski in view of Klein teach the process of claim 8 (above), wherein Skorupski teaches preferably the weight % of alkaline etchant material is about 10% to about 20% by weight of the total amount of etching medium ([0022]).

Claim 23: Skorupski in view of Klein teach the process of claim 6 (above), wherein Klein further teaches preferably the weight % of thickener is about 3 to 20% by weight of the total etching medium (pg 4), but does not explicitly teach the thickener is from 1 to 10% by weight, based on the total amount of the etching medium. It would have been obvious to one of ordinary skill in the art at the time of invention to have selected the concentration of thickener is from 1 to 10% by weight, based on the total amount of the etching medium since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 26: Skorupski in view of Klein teach the process of claim 8 (above), wherein Klein further teaches preferably the weight % of thickener is about 0.5 to 25% and preferably 3 to 20% by weight of the total etching medium (pg 4).

Claim 27: Skorupski in view of Klein teach the process of claim 24 (above), wherein Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% - to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4) to form a printable etchant paste (abstract, pg 5). The combination of these components would leave between 55 and 87% of water by weight of the total amount of the etching

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medium. Although these prior arts did not explicitly teach said solvent is from 15 to 85% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a concentration of solvent within the claimed range since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 28: Skorupski in view of Klein teach the process of claim 10 (above), wherein Skorupski in view of Klein teach an etching medium that can be activated by the input of heat. Skorupski are silent as to the source of the heat, so they do not explicitly teach a source as an IR lamp or a hotplate. Klein teaches a method of using an energy / heat activated etchant wherein the input of energy is supplied in the form of radiant heat via an IR lamp, capable of heating to 300°C (pg 2). It would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the IR lamp as the heat source, as taught by Klein into the method of Skorupski in view of Klein as the primary reference, Skorupski, is silent, and when a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference, additionally Klein teaches a predictable means to apply heat in upwards of 300°C to an etchant paste deposited on a substrate.

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Claim 25 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skorupski in view of Klein as applied to claims 8 and 29 above, and further in view of Ohlsen.

Claim 25 and 30: Skorupski in view of Klein teach the process of claims 8 and 29 (above), wherein Skorupski further teaches wherein the base constituent (see, for example KOH) is in an amount between 5 and 25%, and more precisely 8 to 12% by weight of the etching paste medium ([0022]). Skorupski does not explicitly teach wherein the base constituent is in an amount between 30-40% by weight of said etching medium. Prior art Ohlsen teaches KOH etching mediums possessing 30%wt KOH by weight of etching medium can predictably etch silicon substrates at a rate of 1.65-1.75 micron / min (col 23 lines 20 - 25). Because both Ohlsen and Skorupski in view of Klein teach method of etching silicon with KOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a KOH % of 30 wt% by weight of etching medium, as taught by Ohlsen, as the amount of KOH in the method of Skorupski in view of Klein as Ohlsen teaches a predictable method of etching silicon at a rate of 1.65-1.75 micron / min, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP2144.05II A).

Claim 30 further: Skorupski in view of Klein teach the process of claim 29 (above), wherein Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% - to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4) to form a printable etchant paste (abstract, pg 5). The combination of these components would leave between 55 and 87% of water by weight of the total amount of the etching medium. Although these prior arts did not explicitly teach said solvent is from 55 to 75% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a concentration of solvent within the claimed range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Klein further teaches preferably the thickener is sodium carboxymethylhydroxyl ethylcellulose, and that the weight % of thickener is about 0.5 to 25% and preferably 3 to 20% by weight of the total etching medium (pg 4). Although Skorupski in view of Klein does not explicitly teach wherein the range of thickener is 1.5 to 6% by weight, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a wt% of the thickener within the claimed range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Response to Arguments

Applicant's arguments filed 11/9/10 have been fully considered but they are not persuasive.

In response to applicant's arguments that "the precise and controlled depth of etching is not a consideration for any of the references (pg 9-10 of remarks), the examiner disagrees with this argument and directs the applicant's attention to at least Yamazaki which explicitly teaches the surface being etched to form a roughened / etched surface, and since Yamazaki has explicitly taught wherein such etching achieves etched surface features on the order of 0.1 to 5 microns. Skorupski additionally teaches etching to remove at least 0.45 microns from the substrate. Therefore the depth has been a consideration in the references. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The applicant directs the examiner's attention to a declaration under 37 CFR 1.132 filed 11/9/10 (pg 9-11 of remarks). The examiner asserts that the declarations under 37 CFR 1.132 filed 10/2/09 and 11/9/10 are insufficient to overcome the rejection of claims 2, 4, 6-8, 10-12, 14, and 19-30 based upon the cited prior art as set forth in the last Office action because:

The support provided to demonstrate unexpected results presents evidence conducted for compositions all containing KOH as etching component, and one specific

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thickener (carbomer-type 1), at a specific printing / dispensing parameter while the claimed subject matter covers significantly larger scope (variety of etching components, solvents, and any other additives (alone or combined with any other species); incorporated at values spanning broad ranges without such limitations; at any temperature, time, line width etc. Further the criticality of the ranges of the various components is not adequately supported by the evidence of record. The supplied evidence does not adequately isolate the importance of the endpoints of each of the claimed ranges, and fails to demonstrate unexpected results (has not adequately compared data of comparable compositions which possess wt% within and outside of claimed ranges). Further Example 8, which the applicant has identified as being conducted within the scope of the claims possesses an etching depth outside of the claimed range (3.1 micron), if practicing the claimed method, the claimed results should flow naturally, such a showing weakens Applicant's position. Further Example 12, appears to reside within the scope of at least the independent claims, yet fails to produce the desired effect. Thus there is no showing that the objective evidence of unexpected results is commensurate in scope with the claims.

Further as discussed in the previously, etching depths described by primary references Yamazaki and Skorupski both have taught etching depth ranges overlapping the claimed 1-3 microns, and further have taught that it is well known in the art to vary the etching species / concentration relative to the chemical composition of the substrate to be etched. Additionally, in response to Applicant's arguments against the references individually, no singular prior art reference is used to reject any singular claim, one

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cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In view of the forgoing, when all of the evidence is considered, the totality of the applicant's arguments towards nonobviousness fails to outweigh the evidence of obviousness.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e. that the etchants possess a specific storage stability, diffusion mechanism, response to energy input (pg 10-11 of remarks) and that the claimed composition is used in a process further requiring "subsequent deposition of metallic circuits into the etched lines" (pg 12-13 of arguments), "the compositions of Skorupski do not result in enhanced silicon edge isolation" (pg 12-13 of arguments) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, Applicant's counsel has not provided evidence to support a variety of arguments directed to storage stability, diffusion, etc, and the examiner asserts that the arguments of counsel cannot take the place of evidence in the record. *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965).

In response to applicant's arguments against the references individually (Yamazaki, Ichinose, Skorupski, Klein, Ohlsen, throughout pgs 9-14 of remarks), one

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cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that Yamazaki / Ichinose is nonanalogous art (pg 11-12), it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Prior art that is in a field of endeavor other than that of the applicant or solves a problem which is different from which the applicant was trying to solve, may also be considered for the purposes of 35 U.S.C. 103 "[t]he first error... in this case was... holding that courts and patent examiners should look only to the problem the patentee was trying to solve. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter... The second error [was]... that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem." *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). In this case, both Yamazaki and Ichinose are both (as is the applicant's invention) in the field of alkali etchants and method of applying alkali etchants. In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established

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by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, the motivation to thicken the etching medium taught by Yamazaki is provided by Ichinose which teaches that etching with a paste "has excellent selectivity, and does little to no damage to the non-etching region" (col 1 lines 8-16), additionally, Ichinose teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have thickened, as taught by Ichinose, the etching medium taught by Yamazaki to enable spatial etch selectivity that would eliminate processing steps.

In response to applicant's argument that Skorupski "does not etch silicon surfaces" (pg 12 of remarks). The examiner disagrees and directs the applicant to [0020] (for example) of Skorupski wherein silicon and silicon containing compositions are taught as suitable and conventional substrates to be etched.

In response to applicant's argument that "none of cited references teach or suggest a printable thickened etching paste having a mixture of solvents comprising

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water and at least one other organic solvent" (pg 13 and throughout pgs 9-13 of remarks). The examiner directs the applicant to the teaching in Klein (such as pg 3) that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as solvents for such thickened etching media, and has similarly taught the solvent at a portion of 10-90 wt% (pg 3). In response to applicant's argument that Klein is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Prior art that is in a field of endeavor other than that of the applicant or solves a problem which is different from which the applicant was trying to solve, may also be considered for the purposes of 35 U.S.C. 103 "[t]he first error... in this case was... holding that courts and patent examiners should look only to the problem the patentee was trying to solve. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter... The second error [was]... that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem." *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). In this case, both the method of Skorupski and Klein are both (as is the applicant's invention) in the field of etching silicon containing surfaces and methods of applying such etchants. Additionally, Klein is in the field of applicant's endeavor, namely a novel etching media in the form of etching pastes and use of such

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media. Further Klein has explicitly provided the motivation for combination that it allows a printable, homogeneous etching paste which is significantly less expensive than conventional wet and dry etching methods in the liquid and gas phases (pg 2), additionally use of a thickened paste allows for a high degree of automation and surface design (pg 2, 5). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have thickened, as taught by Klein, the etching medium taught by Skorupski to enable a printable etching process which is significantly less expensive, and possesses a high degree of automation and surface design.

In response to applicant's arguments that "However, there is nothing which would lead a skilled worker to choose from among the 36 specific solvents listed or any of the hundreds of possible solvents from among the classes of solvents to arrive at a mixture of water with another solvent" (pg 12-13 of remarks); the examiner asserts that the primary reference has already taught the water component, and Klein has taught that it is well known in the etching art to provide aqueous mixtures of solvents to predictably perform solvent functions for thickened etching media, and further additionally serve to suitably remove the corrosive media and clean the surface. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an additional solvent species with water to achieve the predictable result of serving as solvent for a thickened etchant. Further in regard to size of the suitable solvents group taught by Klein, the examiner asserts that significant overlap of the taught solvents and the claimed solvents exist between Klein and the claimed invention. Further when the species is clearly named, the species claim is anticipated (rendered

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obvious) no matter how many other species are additionally named. *Ex parte A* 17

USPQ2d 1716 (Bd. Pat. App. & Inter. 1990).

In response to applicant's arguments that In response to applicant's argument that there is nothing within the cited references which would guide a skilled worker which elements of the prior art compositions to leave out in order to arrive at an etching composition that would provide selective etching to a depth of 1-3 microns" (pg 14), the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Further it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). The examiner agrees with applicant that "A skilled worker would recognize that an etchant must be adapted to the surface which it will etch" (pg 11 of remarks) therefore the examiner maintains that any adaptations involved in the combinations of the prior art are within the level of one of ordinary skill in the art. Further the examiner asserts the motivation for combination of the prior art as

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presented is further explained in response to specific arguments above and in the appropriate rejections above.

As to the dependent claims, they remain rejected as no separate arguments are provided.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN H. EMPIE whose telephone number is (571)270-1886. The examiner can normally be reached on M-F, 6:45- 4:15 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Nathan H Empie/
Examiner, Art Unit 1712